

# Chapter 1: Overview and Geographic Concepts

## Overview

### What Is TIGER?

The Bureau's Census TIGER® System automates the mapping and related geographic activities required to support the decennial census and sample survey programs of the Census Bureau starting with the 1990 decennial census. The Census TIGER® System provides support for the following:

- Creation and maintenance of a digital geographic data base that includes complete coverage of the United States, Puerto Rico, the Virgin Islands of the United States, and the Pacific Island Territories
- Production of maps from the Census TIGER® data base for all Census Bureau enumeration and publication programs
- Ability to assign individual addresses to geographic entities and census blocks based on polygons formed by features such as roads and streams

The design of the Census TIGER® data base adapts the theories of topology, graph theory, and associated fields of mathematics to provide a disciplined, mathematical description for the geographic structure of the United States and its territories. The topological structure of the Census TIGER® data base defines the location and relationship of streets, rivers, railroads, and other features to each other and to the numerous geographic entities for which the Census Bureau tabulates data from its censuses and sample surveys. It is designed to ensure that there is no duplication of features or areas.

The building of the Census TIGER® data base involved a variety of encoding techniques such as automated map scanning, manual map digitizing, standard data keying, and sophisticated computer file matching. The goal was to provide automated access to, and retrieval of, relevant geographic information about the United States and its territories.

### TIGER Data Base Extracts

In order for others to use the information in the Census TIGER® data base in a geographic information system (GIS) or for other geographic

applications, the Census Bureau releases periodic extracts of the data base, including the TIGER/Line® files, to the public. Various versions of the TIGER/Line® files have been released; previous versions include the 1990 Census TIGER/Line® files, the 1992 TIGER/Line® files, and the 1994 TIGER/Line® files. The 1992 TIGER/Line® files were produced to satisfy a requirement of the US Department of Education and incorporated all of the updates and revisions since the production of the 1990 TIGER/Line® files. The 1994 TIGER/Line® files were produced to support the programs of the US Department of Transportation, Bureau of Transportation Statistics. The 1995 TIGER/Line® files were originally produced to support Phase I of the Census 2000 Redistricting Data Program.

### **Relationship of TIGER/Line® to 1990 Census Statistical Data**

What makes the TIGER extract products particularly valuable in the GIS environment and to the data user community is the direct linkage between the 1990 decennial census data products and the Census TIGER® data base extracts. TIGER's digital description of the Nation's legal and statistical entities includes Federal Information Processing Standards (FIPS) codes and Census Bureau codes so entities can be easily matched with the 1990 census data. Please refer to the Census Bureau Publication, *1990 Census of Population and Housing Tabulation and Publication Program*, for a description of the Public Law (PL) 94-171 data files, Summary Tape Files (STFs), and other sources of data from the 1990 census.

### **TIGER/Line® Files, 1995**

TIGER/Line® files, 1995 include files for all counties and statistically equivalent entities in the United States, and for the US Virgin Islands, Puerto Rico, and the Pacific Island Territories. The 1994 TIGER/Line® files are provided for American Samoa because no updates have been received since 1994. TIGER/Line® files, 1995 contain some address ZIP Code® information for all but 73 counties (in the 50 States and the District of Columbia). These files provide more address ranges, ZIP Codes®, and +4 Add-On codes than any of the previous versions of the TIGER/Line® files.

The TIGER/Line® files consist of line segments that represent physical features, and governmental and statistical boundaries. The files consist of 17 separate record types, including the basic data record, the shape

coordinate points (feature shape records), and geographic area codes that can be used with appropriate software to prepare maps.

## **Related Files**

**Summary Tape Files (STFs)** provide 1990 statistical data for a wide range of subject headings and geographic entities compatible with the TIGER/Line<sup>®</sup> files. These files are available on tape and CD-ROM.

**PL 94-171 Program** data files provide selected population data for small area geography (state, county, county subdivision, place, census tract/block numbering area, block group, and block) and are compatible with the TIGER/Line<sup>®</sup> files. These files are available on tape and CD-ROM.

**TIGER/SDTS<sup>™</sup>** is a data file following the FIPS spatial data transfer standard (SDTS). These files provide data equivalent to the TIGER/Line<sup>®</sup> files with additional relational data linkages and data content more similar to the Census TIGER<sup>®</sup> data base. The present product is an early prototype, and any subsequent version is likely to be substantially modified.

**The TIGER/Line<sup>®</sup> 103<sup>rd</sup> Congressional District File** contains just the features that form the boundaries of the districts of the 103<sup>rd</sup> Congress. The file follows the format of Record Types 1 and 2 of the 1992 TIGER/Line<sup>®</sup> files. This is a national data set, by state, on one CD-ROM.

**TIGER/Line<sup>®</sup> 1990 County Files** provide the coordinates for the boundaries of all counties and statistically equivalent entities. The files follow the format of Record Types 1 and 2 of the 1992 TIGER/Line<sup>®</sup> files; each set of files covers one state. The boundaries for the states and statistically equivalent areas are for the legal limits. As such, coastal states show a boundary that is three miles offshore and do not contain additional records that depict the shoreline. The same holds true for interior water; a boundary in the Chesapeake Bay will be shown, but the shoreline will not.

**TIGER/Line<sup>®</sup> 1990 Census Tract/Block Numbering Area Files** provide the coordinates and associated feature attributes for the boundaries of all census tract/block numbering areas (CT/BNAs). These files follow

the format of Record Types 1 and 2 of the 1992 TIGER/Line® files; each set of files covers one state.

**North American Statistical Areas Boundary Files (Prototype)**, were produced by a joint research initiative between the Geography Divisions of Statistics Canada and the United States Bureau of the Census. The goal of the files is to provide data users with a convenient, unified, geographical framework that will help facilitate cross-border spatial studies. The files are in TIGER/Line® format and contain geographic coordinates, various attribute information, and most importantly, geographic identification codes that can be used as links to census data from Canada and the United States.

**TIGER/Line® American Indian/Alaska Native Areas File** provides the coordinates for the boundaries of all American Indian and Alaska Native areas (AIANAs) shown in the 1990 census. This file follows the format of Record Types 1 and 2 of the 1992 TIGER/Line® files and covers the Nation.

**TIGER/Line® 1990 County Subdivision Files** provide the coordinates for the boundaries of all county subdivisions (such as minor civil divisions, census county divisions, and unorganized territory). The files follow the format of Record Types 1 and 2 of the 1992 TIGER/Line® files; each set of files covers one state.

**TIGER/Line® 1990 Place Files** provide the coordinates for the boundaries of all incorporated places (including consolidated cities) and census designated places (CDPs). These files follow the format of Record Types 1 and 2 of the 1992 TIGER/Line® files; each set of files covers one state.

### **County-Based Files**

The geographic coverage for a TIGER/Line® file is a county or statistically equivalent entity. See Appendix A for a list of state and county codes and Chapter 4 for a description of county equivalent entities. The county files have a coverage area based on their January 1, 1995 legal boundaries obtained in response to the Census Bureau's Boundary

and Annexation Survey (BAS), or earlier survey depending upon population size. Even though the Census TIGER® data base represents a seamless national file with no overlaps or gaps between parts, the county-based TIGER/Line® files are designed to stand alone as an independent data set. The files can be combined to cover the whole Nation and its territories (see the *Single-Side Flags and County Boundaries* section in Chapter 3).

## **The Data Content of the TIGER/Line® Files**

The TIGER/Line® files contain data describing three major types of features:

- Line features
  - 1) Roads
  - 2) Railroads
  - 3) Hydrography
  - 4) Miscellaneous transportation features and selected power lines and pipe lines
  - 5) Boundaries
- Landmark features
  - 1) Point landmarks such as schools and churches
  - 2) Area landmarks such as parks and cemeteries
  - 3) Key geographic locations (KGLs) such as apartment buildings and factories
- Polygon features
  - 1) Geographic entity codes for areas used to tabulate the 1990 census statistical data and current geographic areas
  - 2) Locations of area landmarks
  - 3) Locations of KGLs

The line feature and polygon information form the majority of data in the TIGER/Line® files. Some of the data describing the lines include coordinates, feature identifiers (names), feature classification codes, address ranges, and geographic entity codes. Chapter 3 details these data items; Chapter 4 defines the geographic entities and codes. The TIGER/Line® files contain point and area labels that describe landmark features. These features provide locational references for field staff and map users.

Area landmarks consist of a feature name or label and feature type assigned to a polygon or group of polygons. Landmarks may overlap or refer to the same set of polygons. See Chapter 3 for more information on landmark data.

## Topology and Spatial Objects in the TIGER/Line® Files

### Spatial Objects in the TIGER/Line® Files

The Census TIGER® data base uses a collection of spatial objects, *points*, *lines*, and *polygons*, to model or describe real-world geography. The Census Bureau uses these spatial objects to represent features such as streets, and assigns attributes to these features to identify and describe specific features such as the 500 block of Market Street in Philadelphia, Pennsylvania.

The TIGER/Line® files contain information about the spatial objects distributed over a series of record types. Users of the TIGER/Line® files may need to link information from several record types to find all the attributes of interest that belong to one spatial object. The final section of this chapter includes a description of the record types.

### Topology

Topology explains how points, lines, and areas relate to each other and is used as the foundation for organizing spatial objects in the Census TIGER® data base. The Census TIGER® data base uses points, lines, and areas to provide a disciplined, mathematical description of the features of the earth's surface. Spatial objects in the Census TIGER® data base are interrelated. A sequence of points define line segments, and line segments connect to define polygons.

Topology provides a basic language for describing geographic features. The Census TIGER® data base relates information to points or *0-cells*, lines or *1-cells*, and polygons or *2-cells*. The number preceding the cell identifies the dimensionality of the object; for instance, a line segment has a single dimension, length. Each of these objects builds on the others to form higher-level objects. The 0-cells form the end points of 1-cells. The 1-cells connect at 0-cells and form closed figures that partition space into polygons or 2-cells.

## Terminology

The terms point, line segment, and polygon are familiar, but general terms that may have different meanings to data users working with a variety of different applications and data sets. The TIGER/Line<sup>®</sup> file documentation uses the terminology from the Spatial Data Transfer Standard (SDTS).

Since the first release of the TIGER/Line<sup>®</sup> files, the US Geological Survey (USGS) has coordinated the development and release of the SDTS, now a Federal Information Processing Standard (FIPS). The SDTS specifies a series of terms and definitions for spatial objects.

Why use the SDTS terminology? Even though the TIGER/Line<sup>®</sup> files do not follow the SDTS format, the TIGER/Line<sup>®</sup> documentation will use these terms and definitions in order to promote a common language for describing geographic data and to facilitate the transition to the SDTS.

The spatial objects in TIGER/Line<sup>®</sup> belong to the “Geometry and Topology” (GT) class of objects in SDTS. The definitions are from FIPS Publication 173, *Spatial Data Transfer Standard* (SDTS) (August 28, 1992) Section 2-2, “Classification and Intended Use of Objects,” pp. 11-20.

**Node** “A zero-dimensional object that is a topological junction of two or more links or chains, or an end point of a link or chain,” is a *node*.

**Entity Point** “A point used for identifying the location of point features (or areal features collapsed to a point), such as towers, buoys, buildings, places, etc.”

**Complete Chain** “A chain [a sequence of non-intersecting line segments] that explicitly references left and right polygons and start and end nodes.” The shape points combine with the nodes to form the segments that make a *complete chain*.

**Network Chains** “A chain that explicitly references start and end nodes and not left and right polygons.”

**GT-Polygon** “An area that is an atomic two-dimensional component of a *two-dimensional manifold*, [which is defined as] one and only one planar

graph and its two-dimensional objects.” *GT-polygons* are elementary polygons that are mutually exclusive and completely exhaust the surface.

## Spatial Objects

The spatial objects in the TIGER/Line® files embody both geometry (coordinate location and shape) and topology (the relationship between points, line objects, and polygons) and therefore belong to the geometry and topology (GT) class of objects in the SDTS. In the SDTS, *nodes* represent point objects (0-cells) that identify the start and end position of lines or 1-dimensional objects (1-cells) called *chains*. The chains in the TIGER/Line® files are *complete chains* because they form polygon boundaries and intersect other chains only at nodes. Topological chains that do not contain polygon information are *network chains*. Data users may choose not to use the polygon or geographic entity codes and consider the TIGER/Line® files a source of network chain data.

Figure 1-1 illustrates the relationship between nodes and complete chains. The figure shows two complete chains forming a central road; a start and end node define each complete chain. Complete chains that meet at an intersection share the same node. As the figure suggests, complete chains may consist of one or more line segments that describe the shape and position of the complete chain. *Shape points* define the line segments and are not part of the topology of the TIGER/Line® files. *Shape points* and the resulting *line segments* are attributes of the complete chains.

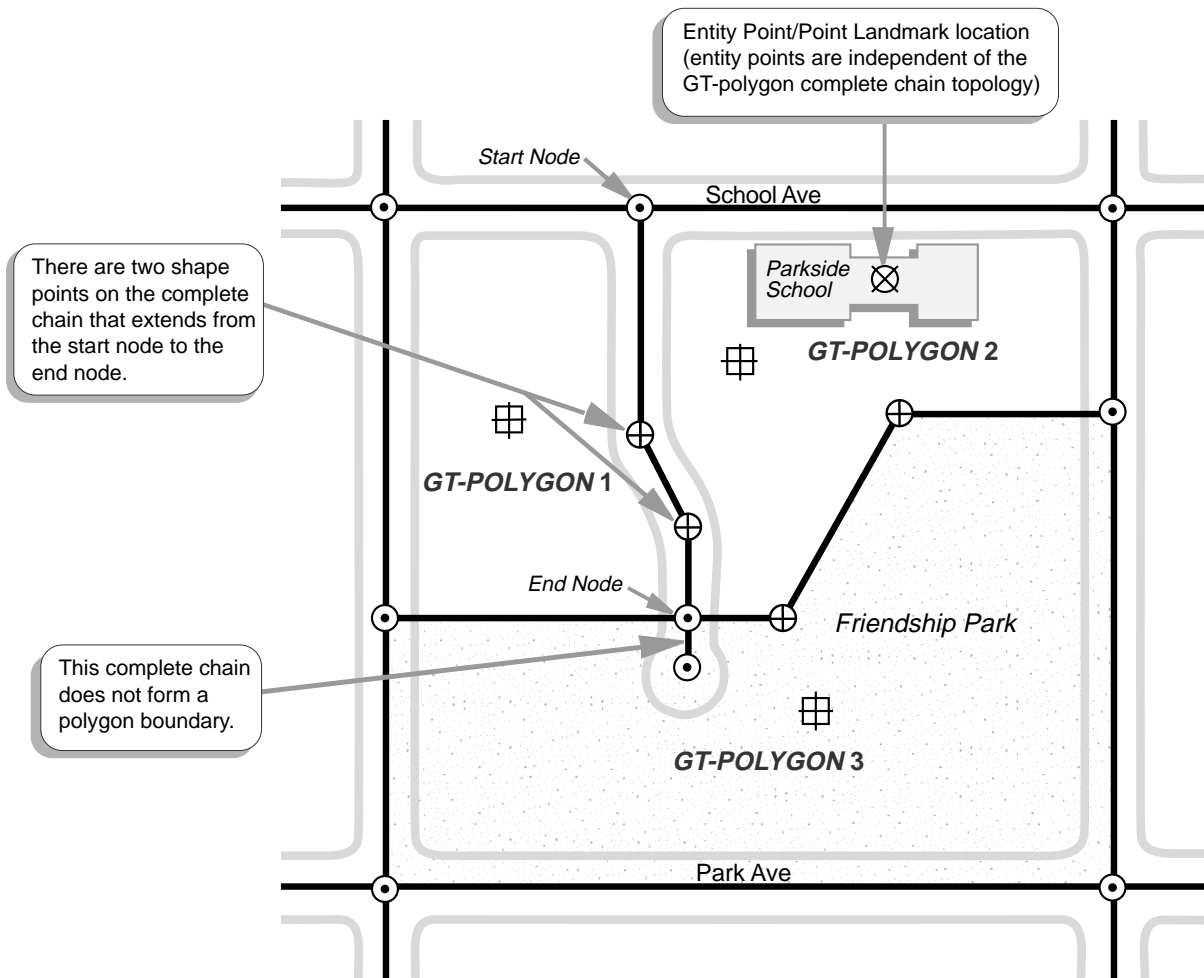
When complete chains link node to node and form a closed figure (a 2-cell), a *GT-polygon* results. The GT-polygon containing Friendship Park in Figure 1-1 is bounded by five complete chains that share five nodes. GT-polygons are elementary units; they are not subdivided into smaller polygons. The polygons completely encompass the area they represent and there is no gap or overlap between adjacent polygons. The geographic entities and area landmarks in the TIGER/Line® files are associated with one, or a set of GT-polygons.







The TIGER/Line® files contain point landmark data that are not included in the Census TIGER® data base topology. Point landmarks



**Figure 1-1 Basic TIGER/Line® File Topology**

The illustration below shows a generalized block that consists of three GT-polygons (GT stands for geometry and topology). The block contains a point landmark (Parkside School) inside GT-polygon 2 and an area landmark (Friendship Park) that is coextensive with GT-polygon 3.



-  **Actual Street Curb Location**
-  **Node**—A zero-dimensional object that incorporates topology and geometry. Each marks the intersection or end point of a complete chain.
-  **Shape Point**—A zero-dimensional object that defines the curvature of a complete chain, but is not required to describe the topology of the complete chain (unlike nodes at intersections or end points).
-  **Point Landmark**—An entity point that identifies the location of a point landmark.
-  **Polygon Interior Points**—A point associated with, and inside of, a polygon.
-  **Complete Chain**—A one-dimensional object having topological and geometric characteristics.

are *entity points* that mark the location of points of interest and are not connected to complete chains or GT-polygons.

The following table summarizes the terms for spatial objects in the TIGER/Line® files:

	Point (0-cell)	Line (1-cell)	Polygon (2-cell)
<b>Topology</b>	Node	Complete Chain or Network Chain	GT-polygon
<b>Non-topology</b>	Entity Point		
<b>Attribute</b>	Shape Point		

## Features

The Census TIGER® data base uses the term *feature* to informally describe spatial objects more complex than nodes, complete chains, or GT-polygons. For instance, Main Street is a feature that may consist of a series of complete chains with the same name. The Census TIGER® data base contains complete chains, but does not contain features or link complete chains to features.

## Left- and Right-Side Data Fields

If one is standing on a complete chain at the *start node* facing the *end node*, data listed in the fields carrying a right qualifier would be found to the right of the complete chain. Notice the position of the start and end nodes for the road in the central section of Figure 1-1; the right-side of the complete chain corresponds to GT-polygon 1 and the left-side corresponds to GT-polygon 2. From the information contained in this basic record, data users can collect the complete chains necessary to construct intersecting polygons and features.

## Single-Layer Topology

All spatial objects in the TIGER/Line® files exist in a single data layer that includes roads, hydrography, railroads, boundary lines, and miscellaneous features; they are topologically linked. For instance, nodes

mark the intersections of roads and rivers. Subsurface features such as tunnels or above surface features such as bridges also create nodes when they cross surface features even though there is no direct real-world connection.

## **Introduction to the TIGER/Line® File Structure**

The 1995 TIGER/Line® files are extracts of selected information from the Census TIGER® data base, organized as topologically consistent networks. The records in the 1995 TIGER/Line® files represent features traditionally found on a paper map. Each complete chain is classified by codes that describe the type of feature it represents.

The 1995 TIGER/Line® files consist of 17 record types that collectively contain geographic information (attributes) such as address ranges and ZIP Codes® and their Add-On codes for street complete chains, names, feature classification codes, codes for legal and statistical entities, latitude/longitude coordinates of linear and point features, landmark features, area landmarks, key geographic features, and area and polygon boundaries. A separate file exists for each of the 17 record types for each county or county equivalent.

The 1995 TIGER/Line® data dictionary in Chapter 6 contains a complete list of all the fields in the 17 record types. Separate chapters cross-list the fields by feature attribute and geographic entity type. The next section provides a summary of the record types in the 1995 TIGER/Line® files.

## **Description of the 1995 TIGER/Line® Record Types**

### **Record Type 1 — Complete Chain Basic Data Record**

Record Type 1 provides a single record for each unique complete chain in the 1995 TIGER/Line® files. The basic data record contains the end nodes for the complete chain. This record also contains address ranges and ZIP Codes® (for most areas of the country where a street name/house numbering system existed at the time of the 1995 Boundary and Annexation Survey) and the current census geographic entity codes for each side of the complete chain. Additional feature identifier, address range, and ZIP Code® data related to Record Type 1 are found on Record

Types 4, 5, 6, and Z. Additional current and 1990 geographic entity codes related to Record Type 1 are found on Record Type 3.

### **Record Type 2 — Complete Chain Shape Coordinates**

Record Type 2 provides an additional series of latitude and longitude coordinate values describing the shape of each complete chain in Record Type 1 that is not a straight line segment. Record Type 2 has a many-to-one relationship with Record Type 1.

### **Record Type 3 — Complete Chain Geographic Entity Codes**

Record Type 3 includes the 1990 voting district (VTD) codes provided to the Census Bureau for the 1990 Census Redistricting Data Program. It also includes the current Census Bureau geographic area codes for the American Indian/TJSA/TDSA/ANVSA areas, and the Alaska Native Regional Corporations.

In the 1995 TIGER/Line® files, all references to the 1980 geographic area codes have been eliminated. In addition, many fields have been replaced with the geographic area codes that were used to tabulate the 1990 census. These codes were previously in Record Type 1. Record Type 3 has a one-to-one relationship with Record Type 1.

### **Record Type 4 — Index to Alternate Feature Identifiers**

Record Type 4 provides an index to alternate feature names associated with the complete chain (Record Type 1). A Record Type 4 will not exist for a Record Type 1 that has only one name. A complete chain can have more than one alternate name. Record Type 4 has a many-to-one relationship with Record Type 1 and a many-to-one relationship with Record Type 5.

### **Record Type 5 — Complete Chain Feature Identifiers**

Record Type 5 contains a list of all unique feature names for complete chains in the TIGER/Line® files. Each name (or feature identifier) has an identification code number (FEAT). Record Type 5 has a one-to-many relationship with Record Type 4 and a one-to-many relationship with Record Type 9.

## **Record Type 6 — Additional Address Range and ZIP Code® Data**

Record Type 6 provides additional address range information for a street complete chain when the information cannot be presented as a single address range (for example, the house/building numbers are not uniformly arranged to form an address range). Record Type 6 appears only for those counties that have address ranges and ZIP Code® information in the Census TIGER® data base. There is no assurance that the address ranges provided on Record Type 6 will cover fewer addresses than the address ranges appearing on Record Type 1. Data users must use Record Type 6 to obtain the entire picture of the potential address ranges along a complete chain. The address ranges used for geocoding along corporate corridors and corporate offset limits appear only in Record Type 6. Record Type 6 has a many-to-one relationship with Record Type 1 and a one-to-one relationship with Record Type Z.

## **Record Type 7 — Landmark Features**

Record Type 7 contains the area and point landmarks from the Census TIGER® data base. If Record Type 7 represents an area landmark rather than a point landmark, then a one-to-one relationship exists with Record Type 8. If a county file has no landmarks, empty files for Record Types 7 or 8 will exist for that county. Record Type 7 now *excludes* all key geographic locations (KGLs) that contain an actual or imputed address and have a ZIP+4® Add-On code. These will now appear in Record Type 9.

## **Record Type 8 — Polygons Linked to Area Landmarks**

Record Type 8 links the polygon identification codes with the area landmark identification codes. If a county file does not have any area landmarks in Record Type 7, there will be no Type 8 records. Record Type 8 has a many-to-many relationship with Record Type P.

## **Record Type 9 — Key Geographic Location Features**

Record Type 9 consists only of KGLs in the Census TIGER® data base that have an actual or imputed address and a ZIP+4® Add-On code. This record type lists the names and structure numbers of special geocoding addresses such as named apartment buildings, shopping centers, and airports. If the structure number of the special geocoding address

is a street address, then the FEAT field links Record Type 9 to Record Type 5 where the street name associated with the address is listed. The KGLs contained in this record type are not included in Record Types 7 or 8, and have no LAND (landmark identification number). Record Type 9 has a many-to-one relationship with Record Type P.

### **Record Type A — Polygon Geographic Entity Codes**

Record Type A contains a record for each polygon represented by Record Type P in the TIGER/Line® files. The Census Bureau provides the basic 1990 census geographic entity codes—state, county, county subdivision, place, American Indian/Alaska Native Areas, census tract/BNA, block—on this record type to assist data users who are interested only in polygon information. Record Type A also includes the Census Transportation Planning Package Area code, school district codes, and urban/rural classification information.

The fields for the 101<sup>st</sup> and the 103<sup>rd</sup> Congressional Districts have been replaced with those for the 106<sup>th</sup> and 108<sup>th</sup> Congressional Districts. However, these fields are blank for this release.

### **Record Type C — Geographic Entity Names**

Record Type C provides information previously supplied in the TIGER/Geographic Name™ files. A unique list of all geographic codes, their associated name, and some entity attributes is supplied for data users in a flat (nonhierarchical) file. It contains a *FIPS Year* field that may have three values: *90* for geographic names and codes valid for the 1990 census, *95* for geographic names and codes valid for the current year, or *blank* when the geographic names and codes are the same for 1990 and 1995. Multiple records for the same geographic entity show its change or correction over time. Record Type C is linked to other record types (1, 3, A, S) through geographic area codes.

### **Record Type H — TIGER/Line® ID History**

Record Type H provides the history of each TIGER/Line® ID when complete chains (Record Type 1) are split or merged, but the source of the change will be blank for this version. Record Type H shows the

TLIDs of the complete chains in existence after the split or prior to the merge.

### **Record Type I — Link Between Complete Chains and Polygons**

Record Type I links Record Type 1, the complete chain basic data, to Record Type P, the polygon internal point. The Record Type I to Record Type 1 link (TLID) may be used to link complete chain attributes and other data record types (2, 3, 4, 6, H, and Z) to each other. The Record I to Record Type P link (CENID and POLYID) may be used to link polygon attributes and other data record types (8, 9, A, and S) to each other. Record Type I has a one-to-one relationship with Record Type 1, but a many-to-one relationship with Record Type P. When Record Type I is linked to a single-sided Record Type 1 (county boundary), it will provide only the left- or the right-polygon identifier.

### **Record Type P — Polygon Internal Point**

There is a Record Type P for every polygon in the TIGER/Line® files. Record Type P has a one-to-many relationship with Record Type I and identifies the internal point coordinates for each polygon. See the *Internal Points* section in Chapter 3.

The TIGER/Line® files include all complete chains and polygons in the Census TIGER® data base. The topology of the Census TIGER® data base ensures that a one-to-one relationship exists between the polygons constructed from Record Types 1 and 2 and Record Type P.

### **Record Type R — TIGER/Line® ID Record Number Range**

Record Type R contains the range of unique complete chain record numbers (TLIDs) assigned to a census file in a nationwide scheme. Record Type R has the lowest (minimum allowable), and the highest (maximum allowable) record numbers for the range. Numbers are assigned to complete chains beginning at the lowest value. The current number is the highest record number for the census file used.

Each TIGER/Line® file consists of an entire county or statistical equivalent. In the Census TIGER® data base, the county or statistical

equivalent may be split into many partitions. The Census Bureau assigns permanent record numbers to each of these partitions. These record numbers are found in Record Type R. Record Type R is not directly linked to any other record type.

### **Record Type S — Polygon Additional Geographic Entity Codes**

Record Type S contains a record for each polygon represented by Record Type P in the TIGER/Line® files. Record Type S contains geographic area codes that identify polygons. Most of the geographic area codes reflect current geography as of the time of extraction from the Census TIGER® data base. Fields are provided for new geographic areas. There is no assurance that the Census Bureau will provide data for any of these new fields.

### **Record Type Z — ZIP+4® Codes**

Record Type Z provides Postal +4 Add-On codes that make ZIP+4® codes out of the ZIP Codes® on Type 1 and Type 6 records. Record Type Z has a one-to-one relationship with Record Type 1 and a one-to-one relationship with Record Type 6.

## **The Relationship Between Spatial Objects and TIGER/Line® Record Types**

The TIGER/Line® files do not have specific record types for each spatial object. Nodes, for example, do not have a separate record type; node coordinates appear with other data in Record Type 1. Defining a complete chain requires information from Record Types 1, 2, and I. Record Types 1 and 2 alone describe the set of *network chains*. GT-polygons require the combined information of Record Types 1, 2, I, and P. See Chapter 3 for a discussion on how to link data using different types of spatial objects.

## **Linkages Between Record Types**

All the record types except Record Type R contain fields (such as TLID, FEAT, CENID, POLYID, LAND, or a geographic area code) that are used to link together data from the record types. Chapter 2 discusses the TLID,



CENID, POLYID, and LAND identification codes in detail. Figure 1-2 shows the record linkage keys. When different record types have a common key with the same data, a linkage can be made between the records. Some of the links are direct, while others are indirect and require a connection through an intermediate record type. An entire TIGER/Line® file can be navigated using the record linkage keys.

Linkages may be made to data external to a TIGER/Line® file. Record Types 1, 3, A, and S contain geographic area code keys—the current or 1990 census geographic entity codes—that may be linked to the Census Bureau’s statistical data (the PL 94-171 data and the several STFs). With geographic information systems for processing and display, data users can use the geographic area codes to link data tabulations with the geographic data.

Figure 1-2 **TIGER/Line® File Record Linkage Keys**

